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Part II

MEASUREMENT OF FIELD POPULATIONS OF *AEDES AEGYPTI* WITH THE OVITRAP IN 1968[1]

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INTRODUCTION. Fay and Perry (1965) and Fay and Eliason (1966) have reported on the development and effectiveness of the ovitrap as a tool for *Aedes aegypti* surveillance.

Preliminary field tests by the Aedes aegypti Eradication Program in 1966 provided additional evidence that the ovitrap is a reliable tool for detecting the presence of *Ae. aegypti*. In 1967, 20,000 ovitraps were placed in Florida, South Carolina, and Texas. The successful use of the ovitraps in conducting preparatory surveys in Florida, Georgia, Alabama, and Texas was reported by Jakob and Bevier (1969). The reliability of the ovitrap in identifying *aegypti* populations proved to be superior to a series of comprehensive larval inspections (Jakob and Bevier, in preparation). Tanner (1969) reported that in an area heavily infested with *aegypti* in 1967 a small number of ovitraps yielded reliable data on the distribution of the species. As a result of the 1967 field tests, the ovitrap replaced comprehensive larval inspections in urban communities in 1968. This paper will report some of the data collected on the ovitrap in 1968.

METHODS. Ovitraps were located on a grid pattern and about 500 feet apart throughout urban communities. The ovitrap consists of a pint jar with the outer surface coated with a glossy black paint. Gravid females of *aegypti* and other container-breeding *Aedes* spp. are attracted to the container and oviposit on a fiberboard paddle about ¾ inch wide and 5 inches long, which is clipped inside the jar in a vertical position. Ovitraps are serviced weekly. This consists of cleaning the jar, adding an inch or more of water, and replacing the old paddle with a new one. The old paddles are examined with the aid of a dissecting microscope for the presence of eggs, the eggs are identified,

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findings are recorded, and the old paddles are discarded. Identification of eggs is a fairly simple operation (Field Guide Series, Ovitrap Surveys).[2]

The following instructions (Field Guide Series, Ovitrap Surveys) for placing the ovitraps were used throughout the AAEP:

1. Place the ovitrap at ground level, if possible in a situation where it will not be disturbed by children or pets.

2. Place the trap where it is sheltered from home lawn sprinklers or excess rainwater, as from leaves or downspouts or shed by broad-leaf vegetation.

3. Place it close to typical adult mosquito resting sites, such as shrubbery or accumulations of junk and trash.

4. Place it near other containers where larvae may occur—if possible, in partial or total shade. Avoid direct afternoon sunlight.

5. Place it at the rear of the property, when practical, rather than in the front yard or near the street. Generally there are more mosquito breeding places and more shelters for the trap at the back of a house than at the front.

6. Do not hide the ovitrap from lateral view. Always remember that the mosquito must see the trap for it to work well.

7. Avoid placing the trap next to piles of tires. They are black and often contain water, and the ovitrap therefore does not compete well with accumulations of them.

Enough supervisory checks were made to ascertain the correct placement of the ovitrap.

The term "consolidation" referred to in this paper is an operational phase in which the *aegypti* are absent or have been reduced to isolated pockets following comprehensive treatments in the Attack Phase. Where a positive ovitrap occurs in a consolidated area, a larval inspection is made in the block with the positive ovitrap, plus the blocks surrounding it. Larval treatment of containers in the inspected area follows.

The aim of this paper is to present additional observations gathered in 1968 concerning (a) the sensitivity of the ovitrap in relation to its placement, (b) sensitivity and economy of ovitraps in consolidated areas vs. larval surveys, and (c) effectiveness of ovitraps for monitoring undisturbed population growth of *aegypti* and other container-breeding *Aedes* in the continental United States and Puerto Rico.

EVALUATION OF PLACEMENT OF THE OVITRAP. The black color attracts gravid *aegypti* females in the laboratory (Fay and Perry 1965). It has been assumed that visible ovitraps would be more attractive than those well-hidden (instruction #6). If this is true, there should be a relationship between visibility and positivity of the ovitraps. A total of 2214 ovitrap sites were studied in areas with a generalized infestation of *aegypti* in Florida, Georgia, South Carolina, and Texas. The percent visibility of the sides of the ovitrap jar at intervals of 1, 5, 10, 15, 20, and 25 feet was recorded along with a history of positivity. No consistent relationship between visibility and positivity of the ovitrap could be demonstrated.

In accordance with the instructions previously cited, ovitraps are often placed under houses, steps, piles of lumber, etc. Supposedly, insufficient clearance above the ovitrap may discourage the females from entering the ovitrap. To clarify this point, the distance between the top of the ovitrap jar and the object it was under was measured for 441 ovitraps in areas with a generalized infestation of *aegypti* in Florida, South Carolina, and Texas. When clearance was measured in intervals of 3 inches, beginning with 3 inches and varying up to 1 foot, no consistent relationship was found between positivity and clearances within this range. Not enough ovitraps were placed with less than 3 inches clearance to allow any

[2] Field Guide Series available through Insect & Rodent Control Branch, Environmental Control Administration, Consumer Protection & Environmental Health Service, Public Health Service, U. S. Department of Health, Education, and Welfare, 3384 Peachtree Rd., Atlanta, Ga. 30326.

definite conclusions concerning smaller clearances.

Ovitraps were often placed against the side of a building or fence. Varying amounts of light and heat from the sun could be expected, depending upon the direction of the sun to the ovitrap and the shading from the building or fence. If this was an important factor in placement, the position of an ovitrap on the north, east, south or west side of buildings should show a relationship to positivity. Of 830 ovitrap sites studied during the summer in the generally infested area of San Antonio, Texas, no association could be demonstrated.

EFFECTIVENESS AND ECONOMY OF OVITRAPS VS. LARVAL SURVEYS IN CONSOLIDATED AREAS. TABLE 1 reviews 212 positive ovitraps of the 27,368 ovitraps exposed in some of the consolidated areas in Florida, South Carolina and Texas in 1968. In making larval inspections around each of these positive ovitraps, *aegypti* larvae were recovered around 20 percent of those in Florida, 30 percent in South Carolina, and 52 percent in Texas. The degree of efficiency of larval inspections in these states is believed to be comparable. The differences in the larval collections may be due to differences in ecological conditions not well understood.

TABLE 1.—*Aegypti* populations detected with the ovitrap as compared to a larval inspection in consolidated areas in 1968.

State	Total ovitraps exposed	No. positive ovitraps in consolidated areas	No. locations with positive ovitraps where *aegypti* larvae found	% locations with positive ovitraps where *aegypti* larvae found
Florida	16,421	98	20	20.4
South Carolina	6,375	89	27	30.3
Texas	4,572	25	13	52.0
Totals	27,368	212	60	28.3

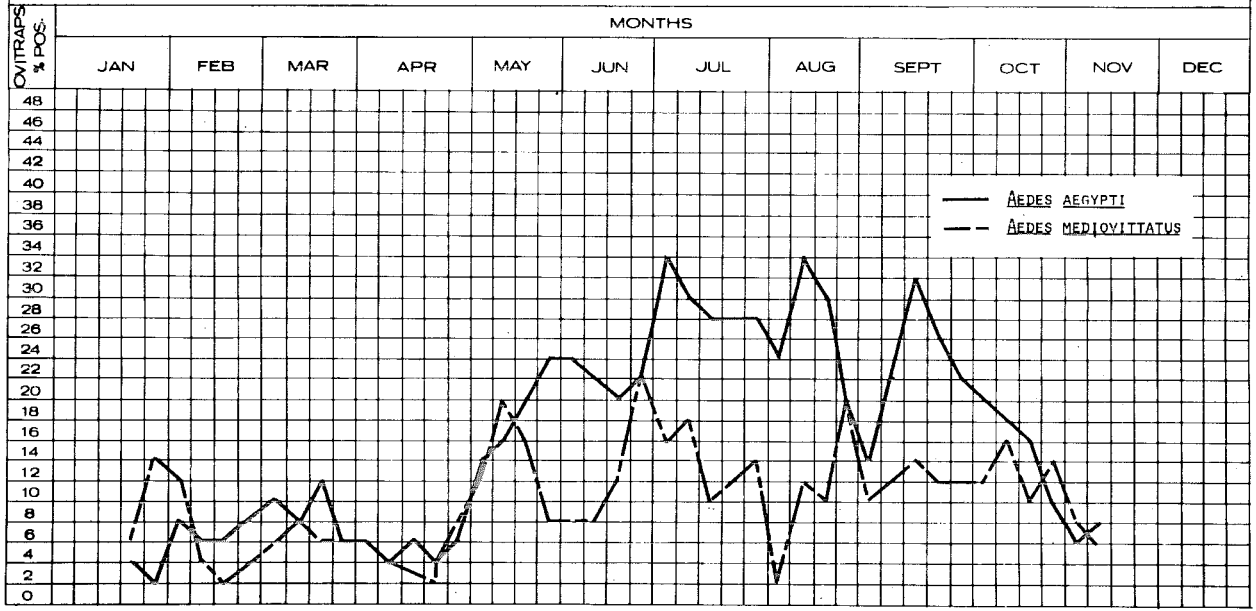
Use of the ovitrap in urban areas to determine where larval inspections and treatment were needed, by comparison with the comprehensive inspections employed for this purpose in the early years of the Eradication Program, saved a tremendous amount of time, manpower, and money. Furthermore, the ovitrap often indicated a population of *aegypti* present in an area where no larvae were recovered in inspections. We learned the hard way that "Negative" larval inspections don't necessarily mean the absence of *aegypti*.

Comprehensive larval inspections made *every two months* cost about 89 cents per premise. With ovitraps the same geographic area can be monitored *weekly* for two months at a cost of about 18 cents per premise (both estimates include overhead costs). Thus larval inspections cost about 5 times as much as ovitraps for the same time period; however, the ovitrap monitors the population 8 times for each time by larval inspection. To achieve similar results through larval inspections would produce at least a 40-fold increase in costs. The logistics and administrative problems in increasing the number of larval inspections would be formidable. The training and supervision required for a man servicing an ovitrap is far simpler than that for a larval inspector.

EFFECTIVENESS OF OVITRAPS FOR MONITORING POPULATION GROWTH OF CONTAINER-BREEDING *Aedes* SSP. San Lorenzo, Puerto Rico, and San Antonio, Texas, were generally infested with *aegypti* in 1968, and no insecticidal pressure was applied for eradication purposes. Figure 1 indicates the weekly percentages of 50 ovitraps positive for *aegypti* and *mediovittatus* in San Lorenzo, Puerto Rico. Figure 2 records the weekly percentages of ovitraps positive for *aegypti, triseriatus,*

Figure 1

PERCENT POSITIVE OVITRAPS BY WEEK FOR AEDES AEGYPTI AND AEDES MEDIOVITTATUS OF 50 OVITRAPS IN SAN LORENZO, PUERTO RICO, IN 1968



FHS 2.84 (NCDC)
3-68

Figure 2

PERCENT POSITIVE OVITRAPS BY WEEK FOR AEDES AEGYPTI, TRISERIATUS AND ATROPALPUS OF 289 OVITRAPS APRIL-AUGUST AND 127 OVITRAPS SEPTEMBER-NOVEMBER IN SAN ANTONIO, TEXAS, IN 1968

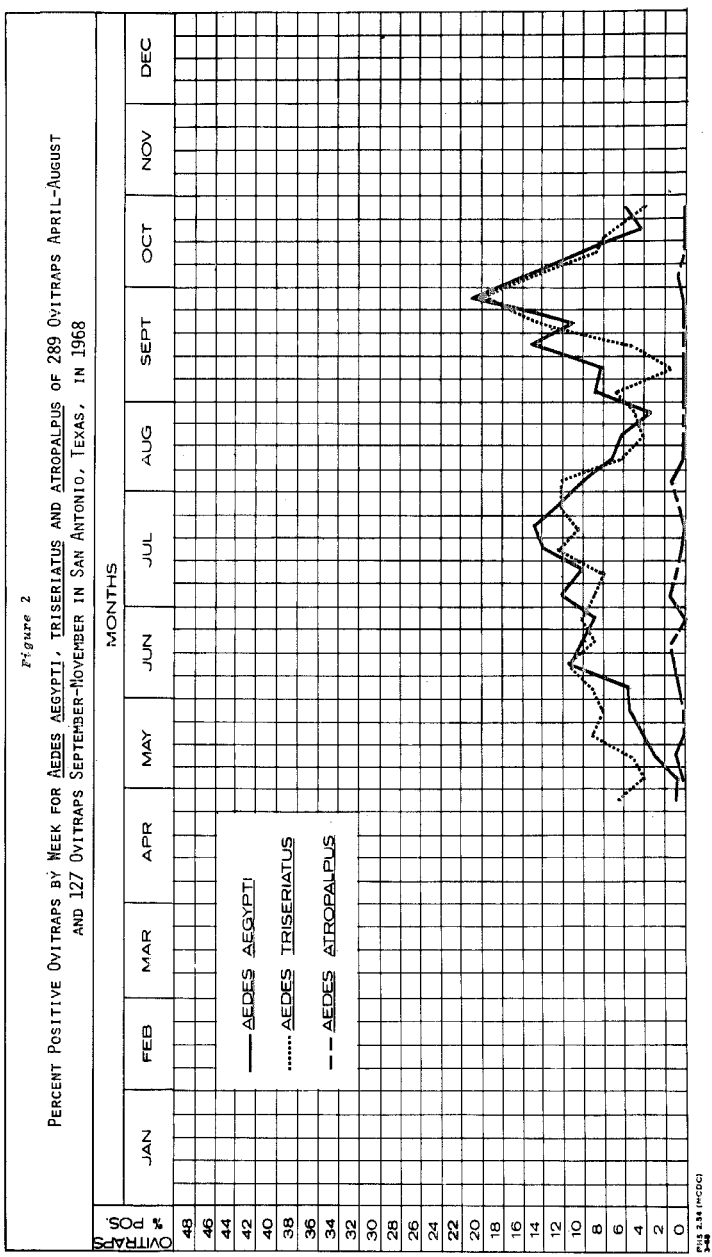
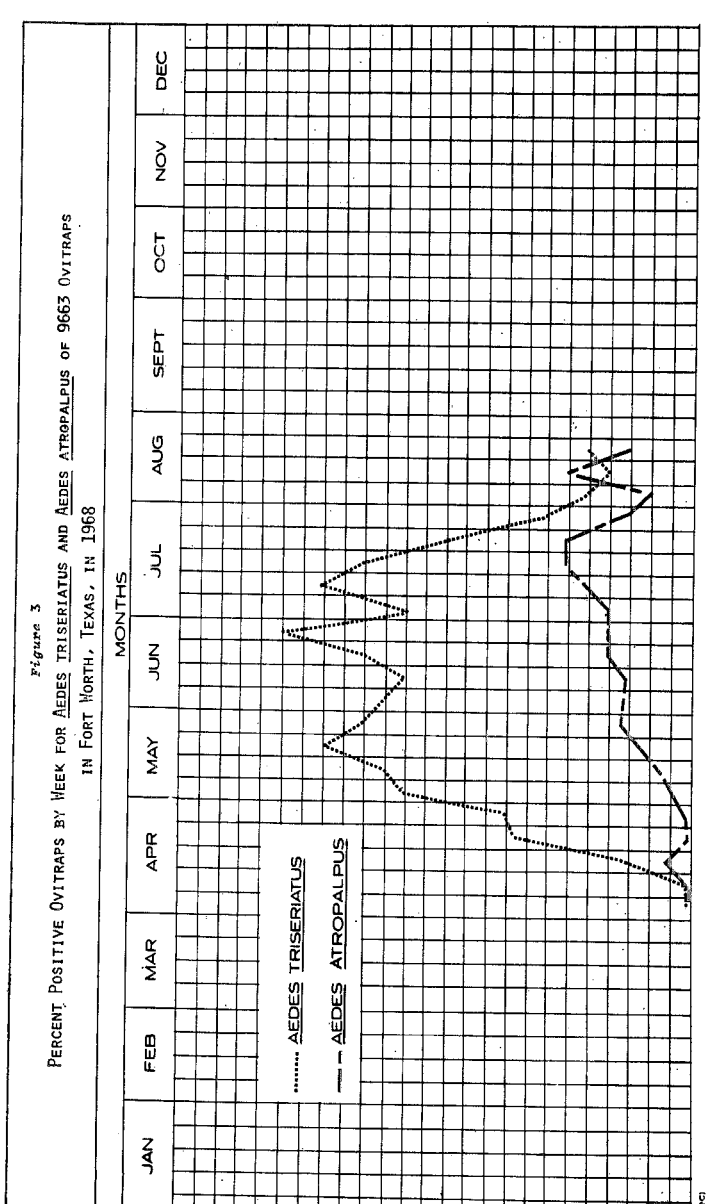


Figure 3

PERCENT POSITIVE OVITRAPS BY WEEK FOR AEDES TRISERIATUS AND AEDES ATROPALPUS OF 9663 OVITRAPS IN FORT WORTH, TEXAS, IN 1968



and *atropalpus* in San Antonio—289 traps operated from May 1 to August 31, and 127 from September 1 to October 31. Fort Worth, Texas, had 77 premises with *aegypti* larvae in 1965, 42 in 1966, 16 in 1967, and no positives in 1968. The weekly percent positive ovitraps in the consolidated areas of Fort Worth is indicated in Figure 3. Of 9,663 ovitraps exposed weekly, *Aedes* spp. were recovered but no *aegypti* were collected in Fort Worth in 1968.

SUMMARY. In an evaluation of ovitrap visibility, placement under objects, and location of the site in relation to the direction of the sun, no association with positivity could be demonstrated. No changes are indicated in the present instructions for placement.

The weekly monitoring of the ovitrap was more effective and economical than larval inspections in detecting *aegypti* populations in consolidated areas in Florida, South Carolina, and Texas in 1968.

It is evident from experience measuring *aegypti* populations that the ovitrap is a reliable tool for studying container-breeding *Aedes* populations.

ACKNOWLEDGMENTS. The assistance of many personnel in Area, Project, and Program Offices of the Aedes aegypti Eradication Program for collecting much of these data is gratefully acknowledged.

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A TECHNIQUE FOR ULV INSECTICIDE APPLICATION FROM HIGH ALTITUDES

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The advantages of ultra low volume application are well known, but operations conducted from low altitudes (100–150 feet) present a safety problem even for multi-engine aircraft. Therefore, in June, 1968 a preliminary pre-dawn test was conducted to determine the feasibility of ULV insecticide application from high altitude. A Piper Pawnee aircraft applied insecticide at ULV rate from an altitude of 1,000 feet. Recovery of spray droplets indicated that the target area could be treated from such an altitude. With this in mind, it was decided to attempt control of adult *Aedes sollicitans* (Walker) on two large tracts of land in Orleans Parish, Louisiana, using ULV application from high altitude.

A series of four tests was conducted with a DC-3 aircraft equipped to apply Dibrom at ULV rates (Machado, 1969). Treatments were made between the hours of 2 a.m. and 4 a.m. for the first three tests, and at sunset for the fourth test. There are several advantages gained by night flying. Stable air conditions are often encountered at this time, and lighted streets, towers, etc., provide excellent landmarks for swath placement in urban areas. Rural areas are easily "flagged" by using a flashing light mounted atop a vehicle.